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L2: Entry 1 of 1 File: USPT Jun 10, 1997

US-PAT-NO: 5637264
DOCUMENT-IDENTIFIER: US 5637264 A

TITLE: Method of fabricating an optical waveguide

DATE-ISSUED: June 10, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Knapp; James H.	Chandler	AZ	N/A	N/A
Norton; Laura J.	Apache Junction	AZ	N/A	N/A
Majercak; Michael L.	Tempe	AZ	N/A	N/A
Majercak; Michael C.	Chandler	AZ	N/A	N/A

US-CL-CURRENT: 264/1.24; 264/2.5, 264/219

CLAIMS:

We claim:
1. A method of fabricating an optical waveguide, the method comprising the steps of:
providing a first mold plate;
providing a second mold plate having a corner, the second mold plate manufactured using a process comprising:
providing a workpiece;
providing an electrical discharge machine having a wire;
conducting a current through the wire to shape the workpiece;
creating a tension in the wire while shaping the workpiece; and
maintaining the tension in the wire while forming the corner in the workpiece to form the second mold plate;
disposing a molding compound between the first mold plate and the second mold plate to form a first portion of the optical waveguide, wherein the molding compound has a first index of refraction;
forming a second portion of the optical waveguide; and
coupling the first portion and the second portion of the optical waveguide to form a core.
2. The method according to claim 1, wherein the coupling step further comprises forming curved edges for the core.
3. The method according to claim 1, wherein the coupling step further includes forming a diameter less than 250 microns for the core.
4. The method according to claim 1, further including disposing a waveguide core material in the core, the waveguide core material having a second index of refraction.
5. The method according to claim 4, further including providing the second index of refraction greater than the first index of refraction.
6. The method according to claim 4, further including providing the second index of refraction approximately between 1.54 and 1.60 and providing the first index of refraction approximately between 1.50 and 1.54.
7. The method according to claim 4, further including providing an adhesive material for the waveguide core material.
8. The method according to claim 1, wherein forming the second portion of the optical waveguide includes disposing the molding compound between the first and second mold plates.

9. The method according to claim 1, further including polishing the second mold plate by using the process for manufacturing the second mold plate.
10. A method of molding an optical waveguide, the method comprising the steps of:
fabricating a first mold plate by providing an electrical discharge machine having a wire, by providing a workpiece, by creating a spark gap between the wire and the workpiece when passing a current through the wire, creating a tension in the wire, and by shaping a corner in the workpiece while keeping the tension and the current in the wire;
providing a second mold plate;
molding a first cladding layer between the first mold plate and the second mold plate;
molding a second cladding layer; and
forming at least one channel by coupling the first cladding layer and the second cladding layer.
11. The method according to claim 10 further comprising positioning an optically transparent material in the at least one channel and between the first and second cladding layers.
12. The method according to claim 11 further including using the optically transparent material to couple the first and second cladding layers.
13. The method according to claim 11 further including providing a first index of refraction of the optically transparent material greater than a second index of refraction of the first cladding layer and greater than a third index of refraction of the second cladding layer.
14. The method according to claim 10 further comprising providing a diameter less than 250 microns for the at least one channel.
15. The method according to claim 10 further including providing round edges for the at least one channel.
16. The method according to claim 10 further including providing symmetrical cladding layers for the first and second cladding layers.
17. A method of fabricating a waveguide, the method comprising the steps of:
manufacturing a first mold plate using a process comprising the steps of:
providing a rigid material;
providing an electrical discharge machine having a wire with a current of a magnitude, the wire having a tension; and
shaping the rigid material with the wire to manufacture the first mold plate, wherein, shaping the rigid material includes forming a corner in the rigid material while maintaining the magnitude of the current in the wire and while maintaining the tension in the wire;
providing a second mold plate;
using the first mold plate and the second mold plate to mold a first portion of the waveguide having a first index of refraction;
forming a second portion of the waveguide having the first index of refraction;
aligning the first portion and the second portion of the waveguide to form a channel through the waveguide;
filling the channel with an optically transparent material having a second index of refraction larger than the first index of refraction; and
using the optically transparent material to bond together the first portion and the second portion of the waveguide.
18. The method according to claim 17, further including using the first and second mold plates to form the second portion of the waveguide.
19. The method according to claim 17, wherein the step of aligning forms a channel having round edges and a diameter less than 250 microns.
20. The method according to claim 17, further including providing the second index of refraction at least 0.028 larger than the first index of refraction.

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L4: Entry 1 of 1 File: USPT Feb 22, 2000

US-PAT-NO: 6027671
DOCUMENT-IDENTIFIER: US 6027671 A

TITLE: Method for producing a microstructured body, a casting frame, and an integrated optical component

DATE-ISSUED: February 22, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kragl; Hans	Diekholzen	N/A	N/A	DEX

US-CL-CURRENT: 264/1.24; 264/1.25, 385/14, 385/89, 385/92

CLAIMS:

What is claimed is:
1. A method for producing a microstructured body, comprising the steps of:
providing a first casting mold;
inserting an insert element into the first casting mold;
filling the first casting mold at least partially with a curable fluid casting frame compound;
curing the curable fluid casting frame compound in order to provide a casting frame having at least one support element formed by the insert element and adapted to receive at least one of an electrical component, an optical component, and an electro-optical component;
arranging one of the electrical component, the optical component, and the electro-optical component at the support element;
providing a second bottom mold plate;
placing the casting frame on the second bottom mold plate in order to form a second casting mold;
filling the second casting mold at least partially with a fluid reaction molding compound; and
curing the fluid reaction molding compound in order to obtain the microstructured body, wherein the casting frame is an integral part of the microstructured body.
2. The method according to claim 1, wherein heat applied over a large area from a bottom side is used to cure the reaction molding compound.
3. The method according to claim 1, further comprising the step of:
placing the second bottom mold plate on a support plate prior to attaching the casting frame to the second bottom mold plate; wherein the second bottom mold plate is composed of a ferromagnetic material and is held in place by a magnetic field.
4. The method according to claim 1, wherein the second bottom mold plate includes at least one elevation in a depression, the at least one elevation leaving a corresponding depression in an integrated optical component when recast with the reaction molding compound.
5. The method according to claim 1, wherein the casting frame includes at least one inverted roof ridge-shaped support structure;
wherein the second bottom mold plate includes at least one roof ridge-shaped frame adjusting elevation; and
wherein the at least one inverted roof ridge-shaped support structure and the at least one roof ridge-shaped frame adjusting elevation are used to laterally and vertically adjust a positioning of the casting frame on the second bottom mold plate.

6. The method according to claim 1, further comprising the step of passing an electric current through the at least one component, the electric current heating the component and curing the reaction molding compound.

7. A microstructured body, comprising:

a casting frame formed from a curable fluid casting compound, the casting frame including a support element connected integrally with the casting frame via struts and provided with at least one of an electrical component, an optical component, and an electro-optical component, wherein:

the casting frame is at least partially filled with a reaction molding compound, and

the casting frame is bonded to the reaction molding compound after the reaction molding compound is cured in accordance with a reaction.

8. The microstructured body according to claim 7, wherein the reaction molding compound is solidified, and the solidified reaction molding compound includes at least one depression.

9. The microstructured body according to claim 8, wherein the at least one depression is filled with a filling compound and serves as a waveguide.

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L1: Entry 1 of 1 File: USPT Feb 22, 2000

US-PAT-NO: 6027671
DOCUMENT-IDENTIFIER: US 6027671 A

TITLE: Method for producing a microstructured body, a casting frame, and an integrated optical component

DATE-ISSUED: February 22, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kragl; Hans	Diekholzen	N/A	N/A	DEX

US-CL-CURRENT: 264/1.24; 264/1.25, 385/14, 385/89, 385/92

CLAIMS:

What is claimed is:
1. A method for producing a microstructured body, comprising the steps of:
providing a first casting mold;
inserting an insert element into the first casting mold;
filling the first casting mold at least partially with a curable fluid casting frame compound;
curing the curable fluid casting frame compound in order to provide a casting frame having at least one support element formed by the insert element and adapted to receive at least one of an electrical component, an optical component, and an electro-optical component;
arranging one of the electrical component, the optical component, and the electro-optical component at the support element;
providing a second bottom mold plate;
placing the casting frame on the second bottom mold plate in order to form a second casting mold;
filling the second casting mold at least partially with a fluid reaction molding compound; and
curing the fluid reaction molding compound in order to obtain the microstructured body, wherein the casting frame is an integral part of the microstructured body.
2. The method according to claim 1, wherein heat applied over a large area from a bottom side is used to cure the reaction molding compound.
3. The method according to claim 1, further comprising the step of:
placing the second bottom mold plate on a support plate prior to attaching the casting frame to the second bottom mold plate; wherein the second bottom mold plate is composed of a ferromagnetic material and is held in place by a magnetic field.
4. The method according to claim 1, wherein the second bottom mold plate includes at least one elevation in a depression, the at least one elevation leaving a corresponding depression in an integrated optical component when recast with the reaction molding compound.
5. The method according to claim 1, wherein the casting frame includes at least one inverted roof ridge-shaped support structure;
wherein the second bottom mold plate includes at least one roof ridge-shaped frame adjusting elevation; and
wherein the at least one inverted roof ridge-shaped support structure and the at least one roof ridge-shaped frame adjusting elevation are used to laterally and vertically adjust a positioning of the casting frame on the second bottom mold plate.

6. The method according to claim 1, further comprising the step of passing an electric current through the at least one component, the electric current heating the component and curing the reaction molding compound.

7. A microstructured body, comprising:

a casting frame formed from a curable fluid casting compound, the casting frame including a support element connected integrally with the casting frame via struts and provided with at least one of an electrical component, an optical component, and an electro-optical component, wherein:

the casting frame is at least partially filled with a reaction molding compound, and

the casting frame is bonded to the reaction molding compound after the reaction molding compound is cured in accordance with a reaction.

8. The microstructured body according to claim 7, wherein the reaction molding compound is solidified, and the solidified reaction molding compound includes at least one depression.

9. The microstructured body according to claim 8, wherein the at least one depression is filled with a filling compound and serves as a waveguide.